

What is claimed is:

1. A facing targets sputtering device for semiconductor fabrication, comprising:

an air-tight chamber in which an inert gas is admittable and exhaustible;

5 a pair of target plates placed at opposite ends of said air-tight chamber

respectively so as to face each other and form a plasma region therebetween;

a pair of magnets respectively disposed adjacent to said target plates such that magnet poles of different polarities face each other across said plasma region thereby to establish a magnetic field of said plasma region between said target plates;

10 a substrate holder disposed adjacent to said plasma region, said substrate holder

adapted to hold a substrate on which an alloyed thin film is to be deposited; and

a back-bias power supply coupled to the substrate holder.

2. A facing targets sputtering device according to claim 1, wherein the back-bias power

15 supply is a DC or an AC electric power source.

3. A facing targets sputtering device according to claim 1, further comprising a first target

power supply coupled to one of the target plates.

4. A facing targets sputtering device according to claim 3, wherein the first target power supply is a DC or an AC electric power source.
5. A facing targets sputtering device according to claim 1, further comprising a second target power supply coupled to the remaining target plate.
6. A facing targets sputtering device according to claim 1, wherein the first and second target power supplies comprises DC and AC electric power sources.
- 10 7. A facing targets sputtering device according to claim 1, further comprising a robot arm to move the wafer.
8. A facing targets sputtering device according to claim 1, further comprising a magnetron coupled to the chamber.
- 15 9. A facing targets sputtering device according to claim 1, further comprising a chuck heater mounted above the wafer.
10. The apparatus of claim 1, wherein the FTS further comprises first and second targets mounted in parallel.

11. The apparatus of claim 10, further comprising magnets positioned between the first and second targets.

5 12. The apparatus of claim 10, further comprising a power supply coupled to the magnets and the targets.

13. The apparatus of claim 10, wherein the substrates are positioned perpendicularly to the planes of the targets.

10

14. The apparatus of claim 13, further comprising a substrate holder to secure the substrate.

15. The apparatus of claim 1, wherein the semiconductor layer is a CMOS layer.

15

16. A method for sputtering a thin film onto a substrate, comprising:
 providing at least one target and a substrate having a film-forming surface portion and a back portion;
 creating a magnetic field so that the film-forming surface portion is placed in the magnetic field with the magnetic field induced normal to the substrate surface portion

20

back-biasing the back portion of the substrate; and
sputtering material onto the film-forming surface portion.

17. A method as in claim 16 including providing a pair of said targets opposed to each other where the substrate is disposed between the targets.
18. A method as in claim 16, further comprising swinging the wafer using a pendulum.
19. A method as in claim 16, further comprising supporting a chuck from underneath rather than side-way.
20. A method as in claim 16, further comprising providing a plurality of sources to deposit materials onto the substrate.